B3.002 Process Description and emissions monitoring

No emissions are discharged directly to the environment without some form of treatment.

The emissions to air are considered to be of low consequence and the equipment in place to minimise any chemical emissions are considered more than adequate to stop any hazardous chemical emissions.

All water emissions are treated in the effluent plant prior to discharge and automatic control with manual checks in place. The effluent is discharged to the local sewerage company under a discharge consent.

The current chemicals used and proposed are considered the best technology currently available to meet the performance demands of the customer base and to increase the working life of finished components.

To manage water consumption, between tank 14, 15 and 16 counter flows are run to reduced consumption and manage water conductivity. Water consumption is approximately 500 to 600 m3 per month.

Research is ongoing to reduce water consumption by recycling however the cost implications to treat the water are financially unviable. As part of the Environmental management System this work will continue.

All emission points have been identified and the requirements for monitoring understood and implemented. The emissions monitoring fall into three sections as follows:

1. Effluent monitoring

All waste water exiting the anodising facility is directed through the effluent plant before entering the foul sewer. The effluent plant has been designed to precipitate all consented metals and the chemistry of the precipitation is common knowledge. To ensure that the system functions correctly there are pH meters to control redox reduction and neutralisation process and a redox meter to control the redox reduction process. Daily internal monitoring of the effluent quality is performed against the requirements of the formal discharge consent. Equally Anglian Water Services undertake routine unscheduled sampling to ensure full compliance. The effluent system incorporates a filtration unit to dewater the sludge and the sludge is stored prior to analysis and disposal by a registered waste handler.

2. Emissions to Air including Odour

The emissions to air are generated as a result of fume extraction of critical process stages. The main emission is water vapour and to ensure that no other emissions are generated water scrubbing is included on the alkali etch extraction system and lime neutralisation is included on the sulphuric acid anodising system. Both systems will be checked daily and logged. The main

test procedure will be pH monitoring. It is considered highly unlikely that any chemical fumes from these two processes will enter the scrubbing system due to the use of in tank circulation however the units have been fitted as a safeguard. The extraction for the seal tank is designed to remove water vapour resulting from the elevated operating temperature (98^{o}C). To reduce the volume of vapour generated and reduce energy consumption croffles are used on the seal tank.

The processes in use have no distinctive odour and it is considered highly unlikely that odours will be generated in the local environment.

An inspection of the stacks is undertaken daily to ensure no failures or odours. The visual inspection of the emissions is designed to ensure no particulate matter or stained fumes are released.

The installation is a 20 stage anodising facility. All water discharged is fed directly to the effluent plant via discharge tanks. To reduce the use of base chemicals the high quality water required for specific tanks is produced using reverse osmosis.

The tanks contain the following

2.0 Process

The main plant consists of a series of 20 holding tanks ranging in size from 7m^3 and 14m^3 The tanks are positioned beneath a carousel transporter which manoeuvres the attached flight bars through the tank dipping process. Parts are loaded onto the flight bars to a defined surface area and secured by individual screw clamps. The carousel moves in accordance with designated software which coordinates the timings to dip the parts into the designated tanks solutions. The sequence of which is dependent on client specifications. The flight bars and parts are lowered into the solution for a specified time to treat the metal part surface. Rinse tanks are utilised to remove treatment chemicals with drag out times of 15 seconds (etch), 10 seconds for anodising and 5 seconds for rinse stags. Following treatment via the tank dipping process the parts are allowed to air dry before being removed from the screw clamps for packing. Parts are transferred by returnable stillage.

The tank contents and principles reactions

Tank 1 - Alkali degrease
(Hot temp 65-75^{O}c) 3%

Tank 2 – Eco Rinse Tank (Water)
Ambient Temp

Tank 3 – Post Rinse Tank (Water)
Ambient Temp

Tank 4 – Etch Tank Sodium Hydroxide
10 - 15% strength (Hot temp 67-75^{o}c)

Tank 5 – Etch Tank Sodium Hydroxide
10 - 15% strength (Hot temp 67-75^{o}c)

$2AL+2NaoH \longrightarrow 2NaALO_2+2H_2O+H_2$

$NaAL0_2 + 2H_2O \longrightarrow NaOh+ AL(OH)_3$

Alkaline Mist H_2

Wash Box (H_20)

Tank 6 – Eco Rinse Tank (Water)
Ambient Temp

Tank 7 – Post Rinse Tank (Water)
Ambient Temp

Tank 8 – Post Rinse Tank (Water)
Ambient Temp

Tank 9 – Desmut Tank 8-12%
Nitric & Hydrofluoric Acid (Ambient Temp)

Tank 10 – Eco Rinse Tank –
De-Ionised Water (Ambient Temp)

Tank 11 – Post Rinse Tank –
De-Ionised Water (Ambient Temp)

Tank 12 – Anodising Tank - 17-18%
Sulphuric Acid (17-22^{o}C Temp)

Tank 13 – Anodising Tank - 17-18%
Sulphuric Acid (17-19^{o}C Temp)

$2AL+3H_2O \longrightarrow AL_2O_3 +6H++6e$

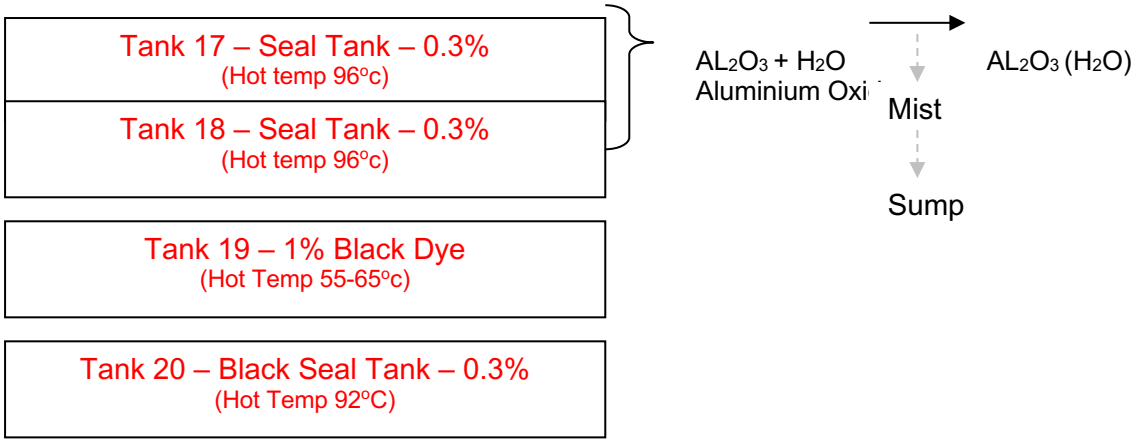
Acid Mist H_2

Wash Box (H_20)

Tank 14 – Eco Rinse Tank –
De Ionised Water (Ambient Temp)

Tank 15 – Post Rinse Tank –
De Ionised Water (Ambient Temp)

Tank 16 – Post Rinse Tank –
De Ionised Water (Ambient Temp)


Tank 17 – Seal Tank – 0.3%
(Hot temp 96°c)
Tank 18 – Seal Tank – 0.3%
(Hot temp 96°c)
Tank 19 – 1% Black Dye
(Hot Temp 55-65°c)
Tank 20 – Black Seal Tank – 0.3%
(Hot Temp 92°C)
AL2O3 + H2O
Aluminium Oxi
Mist
Sump
AL2O3 (H2O)

Tank Volumes:

IF IN DOUBT ASK

System: Anodising	Area: Anodising Plant	Op: n/a
Process: Anodising	Description: Anodising Tank Volume	Sht: 1 of 1

Stage	Description	Process	Volume (m^3)	Aggregate
1	Alkali degrease	R-Clene 121	7,500	No
2	Rinse		7,500	No
3	Rinse		7,500	No
4	Alkali etch	R-Etch 535	14,500	Yes
5	Alkali etch	R-Etch 535	14,500	Yes
6	Rinse		7,500	No
7	Rinse		7,500	No
8	Rinse		14,500	N0
9	Desmut	R-Clene 735	7,500	No*
10	Rinse		7,500	No
11	Rinse		7,500	No
12	Anodise	Sulphuric acid	14,500	Yes
13	Anodise	Sulphuric acid	14,500	Yes
14	Rinse		7,500	No
15	Rinse		7,500	No
16	Rinse		14,500	No
17	Seal	R-Seal Superior	14,500	Yes
18	Seal	R-Seal Superior	14,500	Yes
19	Black dye	Sandol MLW black	7,500	No
20	Seal	R-Seal Superior	7,500	Yes

Notes:

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Extraction to atmosphere is in place for the following stages:

Tank	Process	Purpose
1	Alkali Degrease	To remove excess steam.
5	Alkali Etch	To remove excess steam, water washer removes any alkali residue.
12 +13	Anodising	Air circulation in the tank is via educters (direct fluid or air into tank to create agitation) which reduces the amount of mist.
17 + 18 + 20	Seal	To remove excess steam. Croffles (polyprolene balls) are used to minimise the heat loss and release of steam.

3. Noise Measurements

No noise measurements have been undertaken due to the location of the facility and the low noise level of the equipment on site. As the site is located in an industrial estate with no dwellings close by it is considered highly unlikely that any complaints will be received. No formal noise complaints have been received to date.